

By-Day Creek  
Mono County, California

2004 Fish & Habitat Survey Report

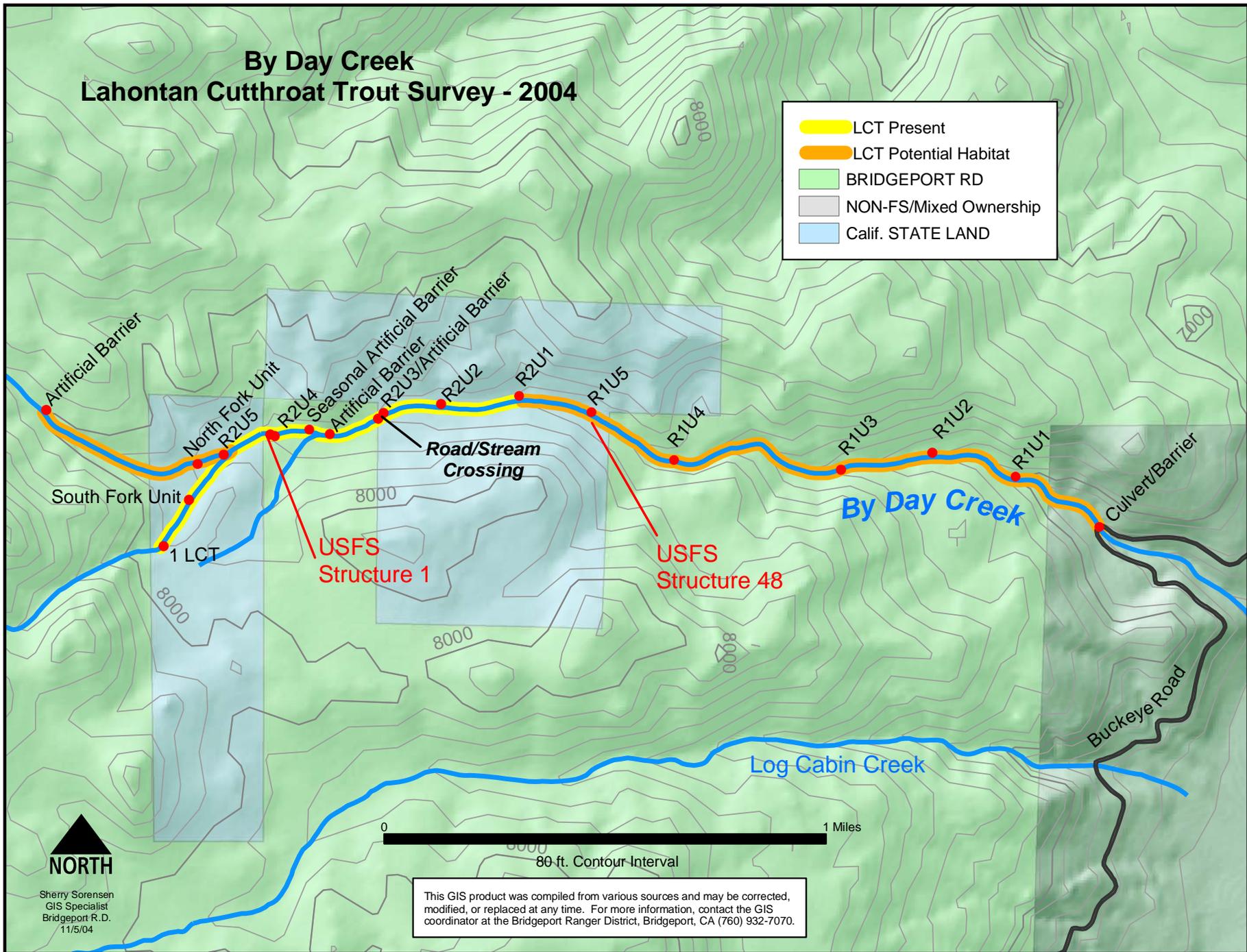


Prepared by:

Bridgeport Ranger District  
Humboldt-Toiyabe National Forest

# By Day Creek Lahontan Cutthroat Trout Survey - 2004

	LCT Present
	LCT Potential Habitat
	BRIDGEPORT RD
	NON-FS/Mixed Ownership
	Calif. STATE LAND



Sherry Sorensen  
GIS Specialist  
Bridgeport R.D.  
11/5/04



This GIS product was compiled from various sources and may be corrected, modified, or replaced at any time. For more information, contact the GIS coordinator at the Bridgeport Ranger District, Bridgeport, CA (760) 932-7070.

## **Introduction**

By-Day Creek is a small stream on the west side of Bridgeport Valley, approximately 4.5 miles west of the town of Bridgeport, in Mono County, CA. During unusually high flood events, By-Day Creek is hydraulically connected to Buckeye Creek, a tributary to the East Walker River. Two grazing allotments occur within the By-Day Creek watershed. Watering sites for both grazing allotments are on the South Fork of By-Day Creek approximately 1 mile upstream of the current LCT distribution. The By-Day Creek watershed has been established as a Critical Aquatic Refuge in the Sierra Nevada Forest Plan Amendment. The By-Day Creek watershed is also managed by CDFG as a State Ecological Reserve. No fishing has been allowed in the By-Day Creek watershed since 1985. Although most of the watershed is managed by the Humboldt-Toiyabe National Forest (HTNF), a few small parcels are managed by California Department of Fish and Game (CDFG). Some private land also occurs within the watershed.

California Department of Fish and Game has no records of stocking Lahontan cutthroat trout (LCT) into By-Day Creek; therefore, it is hypothesized that By-Day Creek supports the only native population of LCT on the Bridgeport Ranger District. Lahontan cutthroat trout in By-Day Creek were first discovered in 1975 as a result of region wide surveys by CDFG (Becker, pers. comm. 2005). In Fall 2004 fin clips were collected from 30 LCT within the By-Day Creek watershed and given to Dr. Mary Peacock at University of Nevada Reno for genetic analysis. Genetic analysis results are expected in early 2005.

In an effort to document LCT distribution, density, and genetic composition, the HTNF, CDFG, and the U.S. Fish and Wildlife Service (USFWS) conducted fish distribution and density surveys on By-Day Creek in October 2004.

## **Methodology**

The mainstem of By-Day Creek was designated into two reaches. Each reach consisted of similar habitats, and each reach was approximately 1 mile in length. Reach 1 began at the artificial barrier/culvert that was reinforced by CDFG in 1996 at the By-Day Creek/Buckeye Road intersection. One unit was sampled on the South Fork of By-Day Creek and one unit was sampled on the North Fork of By-Day Creek.

Each of the two reaches on the mainstem was separated into 5 evenly spaced units. Units 1, 2, 3, and 5 were 40 meters in length. Unit 4 was 100 meters in length. A backpack electroshocker was used to sample these units. Units 1, 2, 3, and 5 were sampled with one pass. Unit 4 was sampled with three passes. Block nets were used at the upstream and downstream ends of each unit sampled.

Appendix 1 contains raw data for each unit sampled. A new data form was prepared for each unit sampled. A Trimble GPS unit was used to document unit locations. GPS locations were taken at the downstream (bottom) end of each unit. Unit length (measured), average width (to the closest 1/10 meter), and average depth (to the closest 1/10 meter) were recorded for each unit.

Notes regarding habitat quality/quantity, observations, morphological characteristics, management concerns, restoration opportunities, etc were recorded in the comments section.

A small piece of caudal fin was clipped from 30 different LCT and placed in separate envelopes to dry. Genetic samples were collected from each unit sampled to obtain spatial variation in the samples. Fin clips were also collected from different length LCT to obtain age class variation. These samples were given to Dr. Mary Peacock at University of Nevada Reno for genetic analysis.

Photographs were taken at the upstream and downstream ends of each unit (looking upstream and downstream) and of important/interesting features.

## **Results**

The distribution of LCT within the By-Day Creek watershed is limited to approximately 1.1 miles of By-Day Creek. In 1980 LCT in By-Day Creek occupied approximately 1.5 miles of stream habitat (1980 LCT Survey Report by CDFG). The current distribution is limited to Reach 2 and approximately 1/3 mile of the South Fork of By-Day Creek (Figure 2 & 3). The length of LCT ranges from 81 to 226 mm total length with the average total length of LCT being 133 mm (Figure 1). The length frequency histogram (Figure 1) suggests that multiple age classes of LCT are found within the By-Day Creek watershed.

The mean number of LCT within Reach 2 is 171 (Figure 4). The upper 90% confidence interval is 309 and the lower 90% confidence interval is 33 (Figure 4). Reach 2 is approximately 0.7 miles long. The mean number of LCT within the entire watershed of By-Day Creek is 186 (Figure 5). The upper 90% confidence interval is 324 and the lower 90% confidence interval is 48 (Figure 5). The mean number of LCT/mile within the entire By-Day Creek watershed is 169 (Figure 6). The upper 90% confidence interval is 295 and the lower 90% confidence interval is 44 (Figure 6).

A HOBO Temperature (C) 1996 Onset data logger was used to collect temperature data in By-Day Creek. The HOBO Temp was located just upstream of Reach 2 Unit 3 at 7664 feet elevation. Temperature was collected from 4 Oct. 2003 to 29 Aug. 2004. The overall maximum temperature was 19.04 degrees Celsius, the overall average temperature was 4.42 degrees Celsius, and the overall minimum temperature was -0.61 degrees Celsius. The average temperature between 1 Nov. 2003 and 31 March 2004 was 0.39 degrees Celsius. The average temperature between 4 Oct. 2003 and 31 Oct. 2003, and between 1 April 2004 and 29 Aug. 2004 was 6.23 degrees Celsius (Figure 8).

The dominant overstory consisted of aspen and conifers, and the dominant understory consisted of willows, aspen, grasses, and rose. The dominant Rosgen channel type is characterized as B. The average width of By-Day Creek is 1.5 meters and the average depth of By-Day Creek is 0.09 meters. The estimated flow during the survey was approximately 2 ft<sup>3</sup>/sec.

## **Discussion**

Low water flows are likely the primary reason why LCT are only occupying 1.1 miles of stream habitat. Lahontan cutthroat trout were not found within Reach 1; however, if water flows increased LCT could likely extend their distribution downstream into Reach 1. The gradient within Reach 1 is slightly steeper than Reach 2, but the overall habitat is still good and has supported LCT in the past. Lahontan cutthroat trout in the South Fork of By-Day Creek are unlikely to extend their distribution upstream because of increased gradient >10%. If flows increased LCT could extend their distribution upstream into the North Fork of By-Day Creek to a rock gabion fish barrier (Figure 38). If flows

increased and LCT extended their distribution up into the North Fork of By-Day Creek and down into Reach 1, an additional 2 miles (approximate) of stream habitat could be occupied by LCT.

The pool to riffle ratio visually appeared to be out of sink; not a 1:1 ratio. Good pool habitat appeared to be sparse. Most of the Lahontan cutthroat trout observed during the survey were occupying the few deep pools that did exist within the watershed. Not many LCT were observed within the riffle habitats.

Three man-made fish barriers are located on the mainstem of By-Day Creek. The lowermost barrier is a culvert that was reinforced by CDFG in 1996 at the Buckeye Road/By-Day Creek intersection to prevent non-native fish from Buckeye Creek migrating upstream into the By-Day Creek watershed. The barrier is approximately 5 feet high (Figure 9). The other two barriers are rock gabion barriers (Figures 24 & 28) located within Reach 2. Both rock gabion barriers were originally installed to probably control headcutting. The Bridgeport Ranger District is planning to alter these two rock gabion barriers within Reach 2 in Fall 2005 to provide LCT the ability to migrate up and downstream within the watershed without unobstructed movement. A third rock gabion structure on the mainstem (Figure 29) does not appear to currently be a fish barrier, but the structure needs to be continually monitored. Another rock gabion fish barrier is located on the North Fork of By-Day Creek, approximately 1/3 mile upstream of the North and South Fork confluence (Figure 38).

Forest System Road 32076 parallels By-Day Creek and in a few locations comes within approximately 10 feet of the stream. Although the road is closed to public access on CDFG property, reports of illegal motor vehicle use in the watershed are common. Forest System Road 32076 crosses By-Day Creek (Figure 27) at Reach 2 Unit 3. The road crossing is causing increased erosion, sedimentation, and turbidity within By-Day Creek. The Bridgeport Ranger District is planning to construct a 3 sided concrete box bridge at the road crossing in Fall 2005. The Bridgeport Ranger District also plans to conduct general maintenance on Forest System Road 32076 to reduce erosion impacts. In areas where the road pinches the stream, the District also plans to install willow waddles to provide some bank vegetation and reduce the amount of erosion reaching the stream.

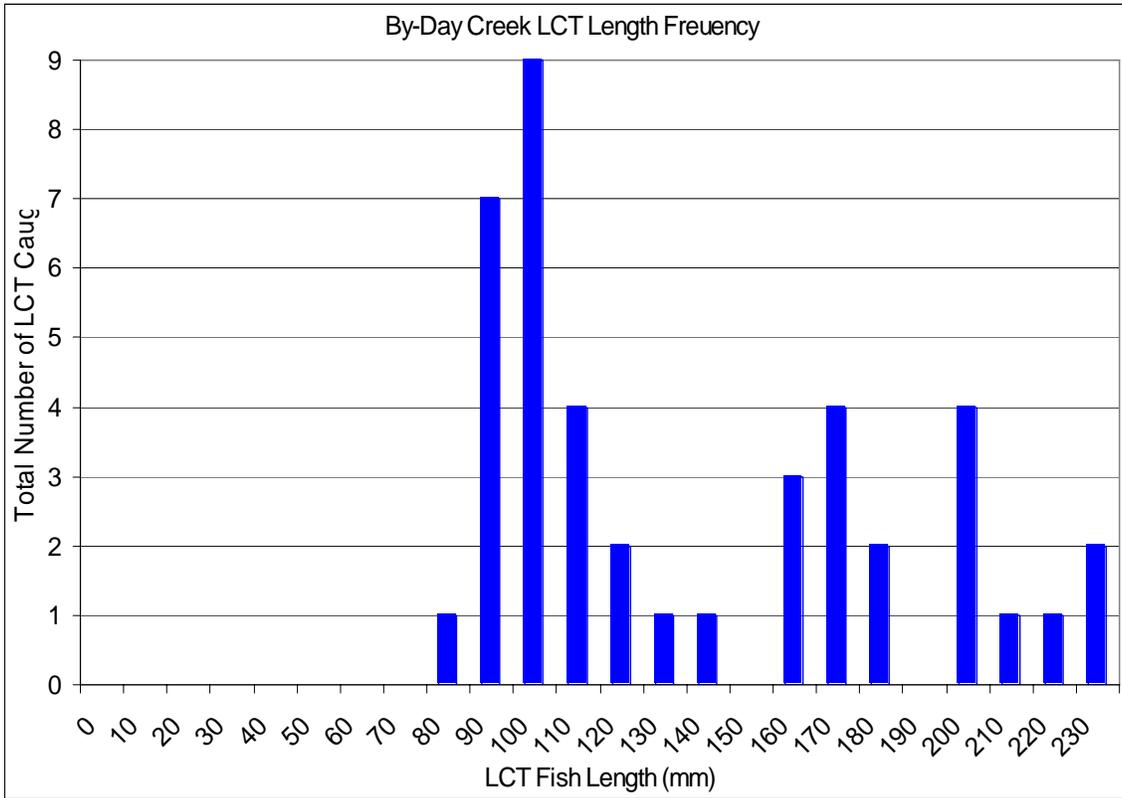
Impacts from electroshocking are a concern, and care was taken to limit LCT exposure to both handling and electrical currents. Lahontan cutthroat trout were closely monitored immediately after being netted. No obvious injuries to LCT were observed. The LCT appeared to respond well to the method of survey. No LCT mortality was documented.

The 2004 Lahontan cutthroat trout population estimate is low compared to the population estimates in 1980, 1983, 1984, and 1985 (Figure 7); however, the 2004 population estimate is higher than the 1996 population estimate (Figure 7). In 1996 only a one pass depletion survey was conducted; therefore, the 1996 population estimate may be conservative. To reduce potential impacts of electrofishing on LCT, visual surveys were conducted from 1998 through 2001 (Figure 7).

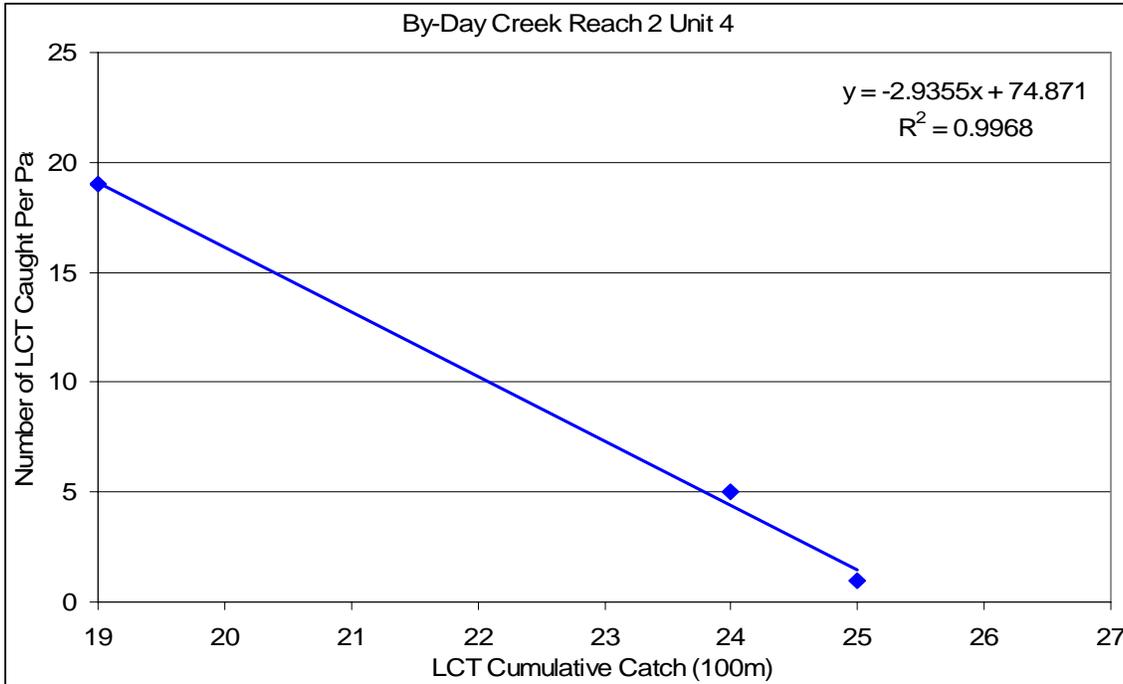
In 1982, 18 LCT were collected from the mainstem of By-Day Creek and transplanted into the upper reaches of the North Fork and 10 LCT were transplanted into the upper reaches of the South Fork of By-Day Creek (1982 Fish Survey Report by CDFG). In 2004 LCT surveys were not conducted above the artificial barrier on the North Fork and above the gradient barrier on the South Fork due to low flows and marginal habitat. Conducting electrofishing surveys in the upper reaches of the North and South Forks should be conducted to document if LCT are present.

## **Recommendations**

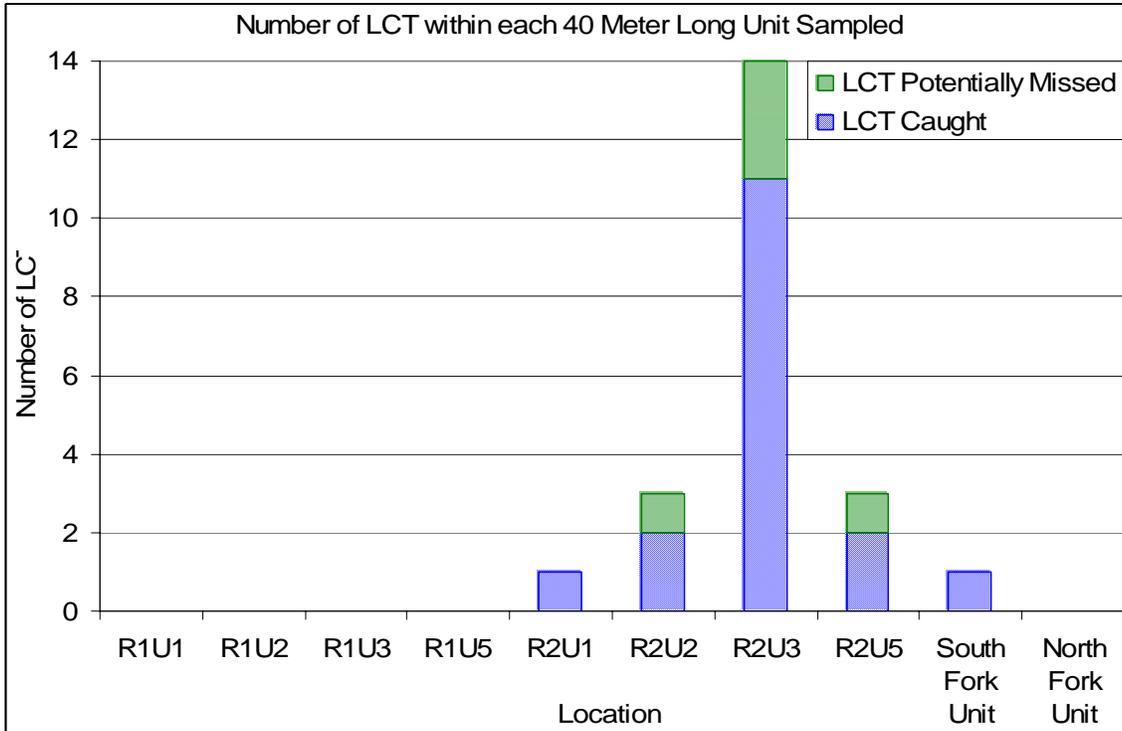
1. Conduct an R1R4 habitat survey on By-Day Creek. This survey will show the pool to riffle ratio. If pools are lacking, implement the appropriate actions to provide LCT with additional pool habitat.
2. In 2009 conduct another similar LCT distribution and density survey. Monitor LCT response to altering the rock gabion barriers (Figures 24 & 28) and to the bridge construction.
3. Conduct electrofishing surveys in the upper reaches of the North and South Forks to determine if LCT are still present from the 1982 transplant.
4. Figure 29 is a rock gabion structure that does not currently appear to be a fish barrier; however, this structure needs to be continually monitored.
5. Maintain Forest System Road 32076 to minimize erosion impacts on By-Day Creek.
6. Once the genetic analysis is completed, implement actions consistent with the conclusions made from the analysis.
7. Make sure that all work planned for Fall 2005 related to bridge construction, road maintenance, altering artificial barriers, and streambank restoration, is implemented.



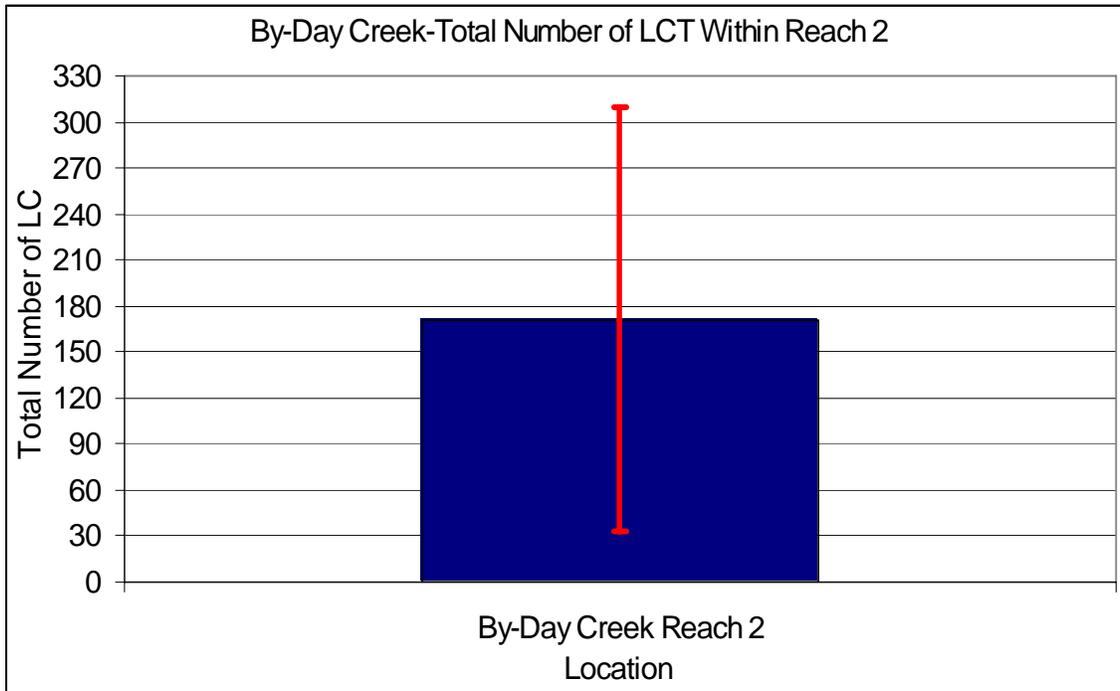
**Figure 1:** Length frequency of Lahontan cutthroat trout caught from By-Day Creek, Bridgeport Ranger District. By-Day Creek was surveyed on October 5 & 6, 2004. The average length of LCT is 133 mm (5 inches).



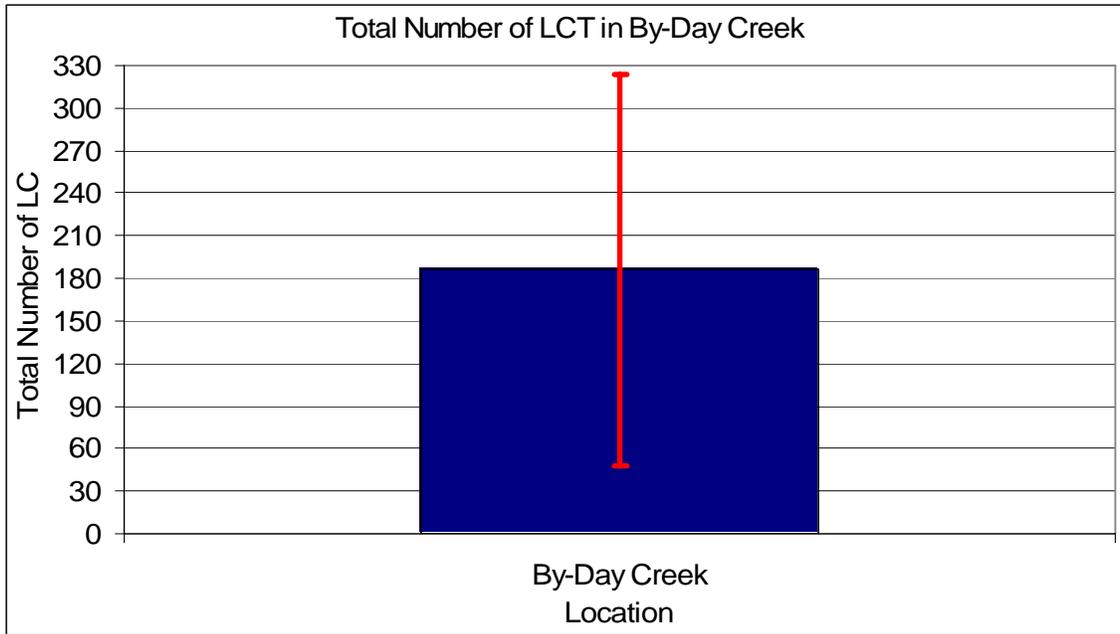
**Figure 2:** Linear regression equation for cumulative number of Lahontan cutthroat trout caught from By-Day Creek, Bridgeport Ranger District, Reach 2/Unit 4. Using the linear regression equation, the estimated total number of LCT within Reach 2 Unit 4 is 26. Reach 2/Unit 4 was 100 meters long and was electroshocked three times. Block nets were set at the top and bottom of the unit to keep fish from entering and leaving the unit. Reach 2/Unit 4 is located at UTM N: 4238199.12 & E: 295624.10. Survey was conducted on 6 Oct. 2004. Nineteen fish caught on the first pass is 73% of the estimated total number of LCT within the 100 meter long unit; therefore, the estimated miss rate of LCT from Reach2/Unit 4 is 27%. Zero fish were caught from Reach 1/Unit 4; also a 100 meter long unit; however, 1 LCT was sited at Reach1/Unit 4 but was not captured.



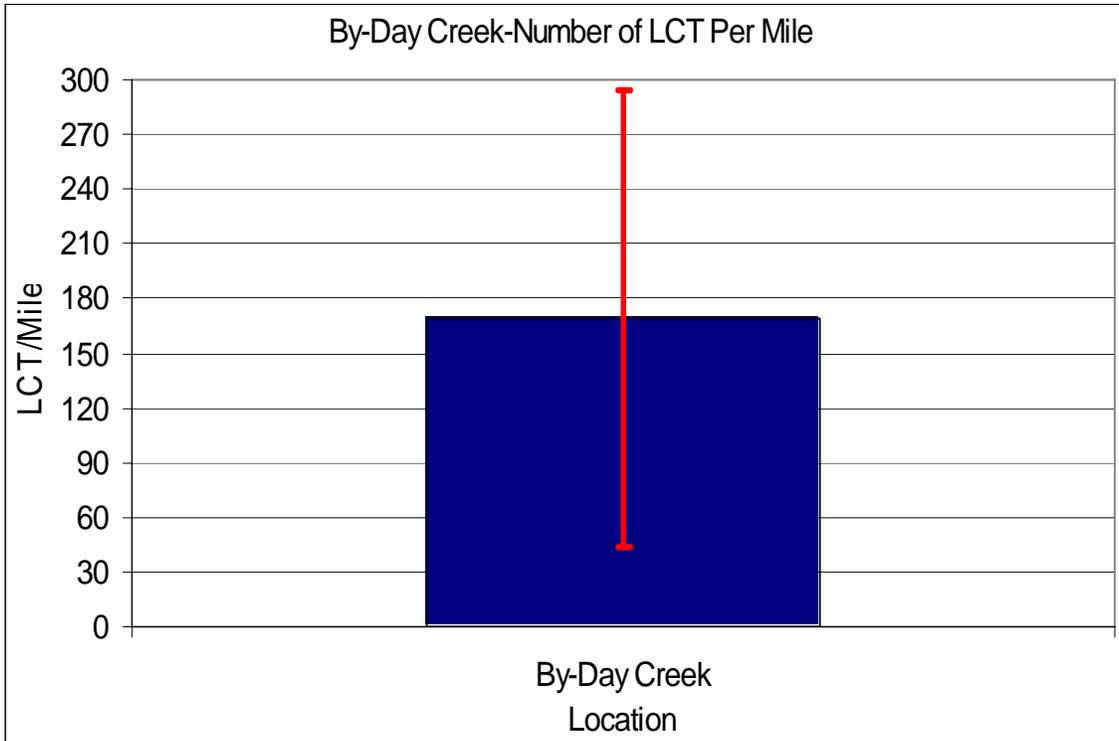
**Figure 3:** Number of LCT captured and potentially missed from each 40 meter long unit sampled on By-Day Creek, Bridgeport Ranger District. Surveys were conducted on October 5 & 6, 2004. Each unit was electrofished one time. The South Fork Unit and Reach 2 Units 1, 2, 3, and 5 all had habitat similar to the habitat on Reach 2/Unit 4. Reach 2/Unit 4 had a miss rate of 27% (Figure 2); therefore, an additional 27% of the captured LCT from each unit was added to the South Fork Unit and Reach 2 Units 1, 2, 3, and 5 to account for potentially missed LCT from each unit.



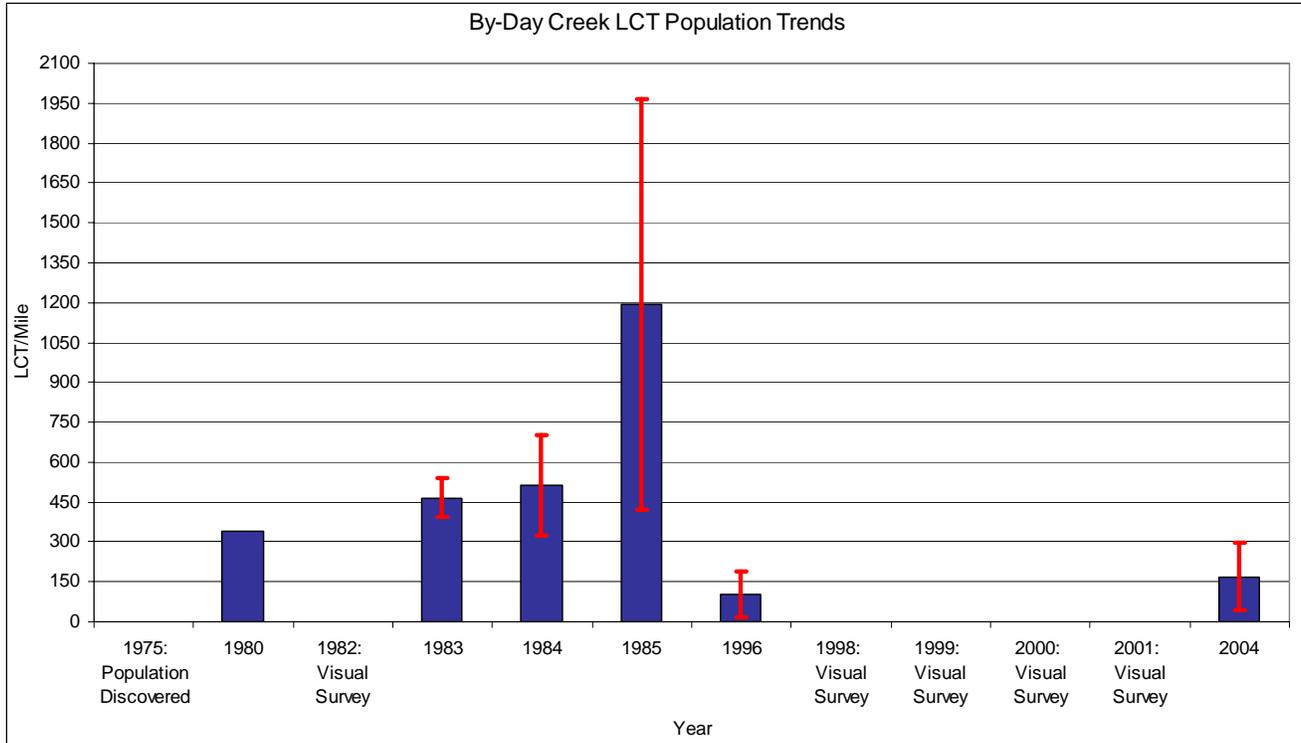
**Figure 4:** Mean and 90% confidence interval for the estimated total number of LCT within By-Day Creek Reach 2, Bridgeport Ranger District. By-Day Creek was surveyed on October 5 & 6, 2004. The mean number of LCT is 171, the upper 90% confidence interval is 309, and the lower 90% confidence interval is 33. This area had the highest density of LCT. By-Day Creek Reach 2 is approximately 0.7 miles long.



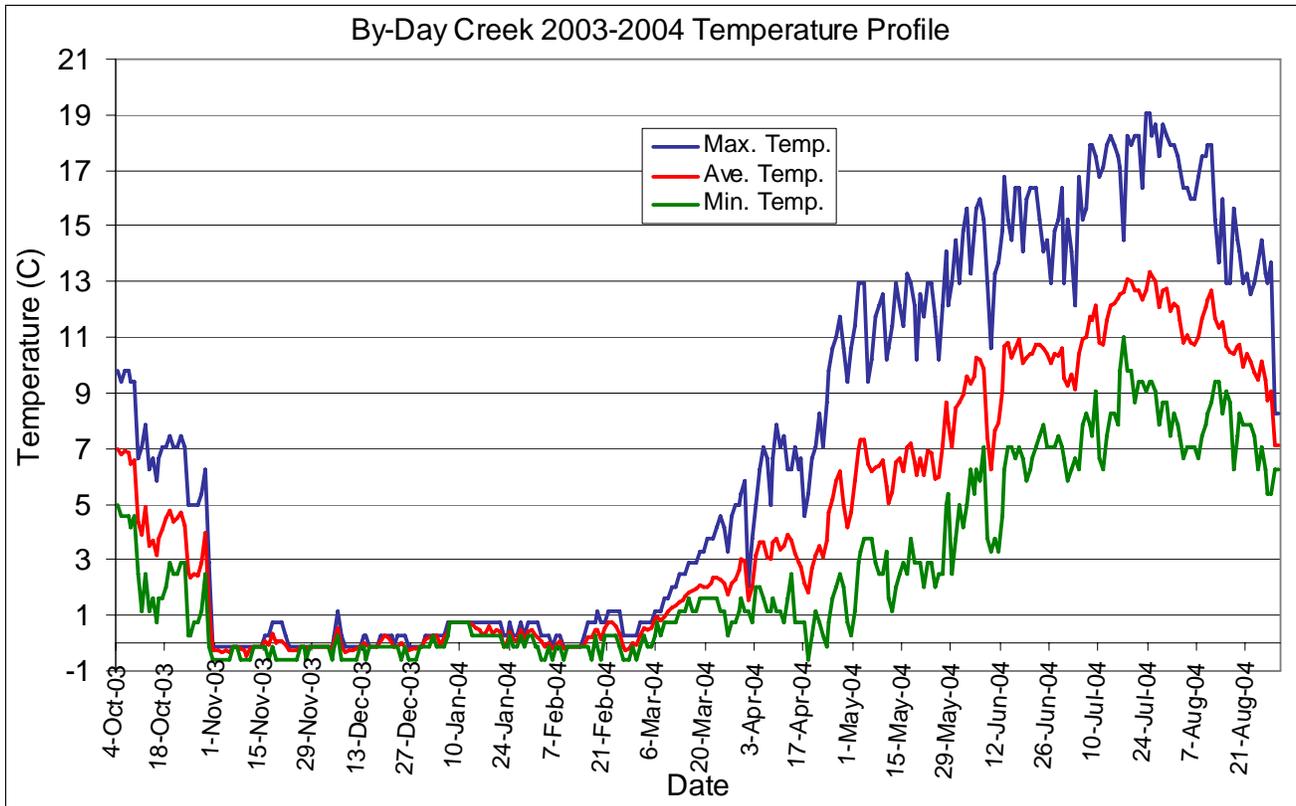
**Figure 5:** Mean and 90% confidence interval for the estimated total number of LCT within By-Day Creek, Bridgeport Ranger District. By-Day Creek was surveyed on October 5 & 6, 2004. The mean number of LCT is 186, the upper 90% confidence interval is 324, and the lower 90% confidence interval is 48. Lahontan cutthroat trout in By-Day Creek are occupying approximately 1.1 miles of stream habitat.



**Figure 6:** Mean number of LCT/mile and 90% confidence interval for LCT in By-Day Creek, Bridgeport Ranger District. By-Day Creek was surveyed on October 5 & 6, 2004. The mean number of LCT/Mile is 169, the upper 90% confidence interval is 295, and the lower 90% confidence interval is 44. Lahontan cutthroat trout in By-Day Creek are occupying approximately 1.1 miles of stream habitat.



**Figure 7:** Mean number of LCT/mile and 90% confidence intervals for Lahontan cutthroat trout in By-Day Creek, Bridgeport Ranger District, between 1980 and 2004. Not enough information was provided in the 1980 report to compute a confidence interval. In 1983, 1984, 1985, and 2004 a 2-3 pass depletion survey was conducted. In 1980 and 1996 only a one pass depletion survey was conducted; therefore, the 338 LCT/mile in 1980 and 103 LCT/mile in 1996 are probably conservative. In 1980 LCT were occupying approximately 1.5 miles of stream habitat. In 2004 LCT were occupying approximately 1.1 miles of stream habitat.



**Figure 8:** 2003-2004 temperature profile for By-Day Creek, Bridgeport Ranger District. The overall maximum temperature was 19.04 degrees Celsius, the overall average temperature was 4.42 degrees Celsius, and the overall minimum temperature was -0.61 degrees Celsius. The average temperature between 1 Nov. 2003 and 31 March 2004 was 0.39 degrees Celsius. The average temperature between 4 Oct. 2003 and 31 Oct. 2003, and between 1 April 2004 and 29 Aug. 2004 was 6.23 degrees Celsius. A HOBO Temperature (C) 1996 Onset data logger was used to collect the temperature data. The HOBO Temp was located near Reach 2 Unit 3 at 7664 feet elevation. The HOBO Temp was located at UTM N: 4238262 & E: 295999. Temperature was collected from 4 Oct. 2003 to 29 Aug. 2004.



**Figure 9:** By-Day Creek, Bridgeport Ranger District, fish barrier at the By-Day Creek/Buckeye Road intersection. Picture was taken on 5 Oct. 2004. Barrier is located at UTM N: 4237867.76 & E: 298628.52. This culvert was purposely installed by CDFG in 1996 to keep non-native fish from migrating upstream into the watershed. The barrier is approximately 5 feet high.



**Figure 10:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 1/Unit 1. Unit is right next to the road. This Unit is located at UTM N: 4238050.98 & E: 298323.02. Picture was taken on 5 Oct. 2004.



**Figure 11:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 1/Unit 1. Unit is right next to the road. This Unit is located at UTM N: 4238050.98 & E: 298323.02. Picture was taken on 5 Oct. 2004.



**Figure 12:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 1/Unit 2. This Unit is located at UTM N: 4238138.05 & E: 298019.39. Picture was taken on 5 Oct. 2004.



**Figure 13:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 1/Unit 2. This Unit is located at UTM N: 4238138.05 & E: 298019.39. Picture was taken on 5 Oct. 2004.



**Figure 14:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 1/Unit 3. This Unit is located at UTM N: 4238076.85 & E: 297685.72. Picture was taken on 5 Oct. 2004.



**Figure 15:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 1/Unit 3. This Unit is located at UTM N: 4238076.85 & E: 297685.72. Picture was taken on 5 Oct. 2004.



**Figure 16:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 1/Unit 4. Unit is located near the CDFG EcoReserve gate. This Unit is located at UTM N: 4238111.46 & E: 297078.05. Picture was taken on 5 Oct. 2004.



**Figure 17:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 1/Unit 4. Unit is located near the CDFG EcoReserve gate. This Unit is located at UTM N: 4238111.46 & E: 297078.05. Picture was taken on 5 Oct. 2004.



**Figure 18:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 1/Unit 5. This Unit is located at UTM N: 4238284.72 & E: 296777.23. Picture was taken on 5 Oct. 2004. Unit is located next to USFS in-stream structure 48.



**Figure 19:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 1/Unit 5. This Unit is located at UTM N: 4238284.72 & E: 296777.23. Picture was taken on 5 Oct. 2004. Unit is located next to USFS in-stream structure 48.



**Figure 20:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 2/Unit 1. This Unit is located at UTM N: 4238344.25 & E: 296513.85. Picture was taken on 5 Oct. 2004. Unit is located near USFS in-stream structure 39.



**Figure 21:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 2/Unit 1. This Unit is located at UTM N: 4238344.25 & E: 296513.85. Picture was taken on 5 Oct. 2004. Unit is located near USFS in-stream structure 39.



**Figure 22:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 2/Unit 2. This Unit is located at UTM N: 4238315.58 & E: 296228.56. Picture was taken on 5 Oct. 2004. Unit is located near USFS in-stream structure 33.



**Figure 23:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 2/Unit 2. This Unit is located at UTM N: 4238315.58 & E: 296228.56. Picture was taken on 5 Oct. 2004. Unit is located near USFS in-stream structure 33.



**Figure 24:** By-Day Creek, Bridgeport Ranger District, gabion weir between USFS structure 25 and USFS structure 26 at the bottom of Reach 2/Unit 3. Picture was taken on 20 May 2004. Pool depth below the weir is 0.45 meters. Height of the vertical drop is 0.5 meters. Structure is currently acting as a fish barrier. Barrier is located at UTM N: 4238297.47 & E: 296047.52.



**Figure 25:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 2/Unit 3. This Unit is located at UTM N: 4238297.47 & E: 296047.52. Picture was taken on 5 Oct. 2004. Unit started just downstream of an artificial rock gabion barrier.



**Figure 26:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 2/Unit 3. This Unit is located at UTM N: 4238297.47 & E: 296047.52. Picture was taken on 5 Oct. 2004. Unit ended just upstream of the road-stream ford crossing.



**Figure 27:** By-Day Creek, Bridgeport Ranger District, road-stream crossing near the top of Reach 2/Unit 3. Picture was taken on 27 August 2003. The road crossing is located at UTM N: 4238281.70 & E: 296019.87.



**Figure 28:** By-Day Creek, Bridgeport Ranger District, USFS structure 11. Picture was taken on 20 May 2004. Structure is a fish barrier. Pool depth below structure is 0.45 meters. Height of the vertical drop is also 0.45 meters. Barrier is located upstream of Reach 2/Unit 3 at UTM N: 4238205.55 & E: 295824.03.



**Figure 29:** By-Day Creek, Bridgeport Ranger District, USFS structure 8. Picture was taken on 20 May 2004. Pool depth below gabion structure is 0.55 meters. Height of the vertical drop is 0.35 meters. At this time the gabion structure does not appear to be a fish barrier. Gabion structure is located upstream of Reach 2/Unit 3 at UTM N: 4238221.74 & E: 295749.11.



**Figure 30:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 2/Unit 4. This Unit is located at UTM N: 4238199.12 & E: 295624.10. Picture was taken on 6 Oct. 2004. Unit is located near USFS in-stream structure 2.



**Figure 31:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 2/Unit 4. This Unit is located at UTM N: 4238199.12 & E: 295624.10. Picture was taken on 6 Oct. 2004. Unit is located near USFS in-stream structure 2.



**Figure 32:** By-Day Creek, Bridgeport Ranger District, looking upstream at Reach 2/Unit 5. This Unit is located at UTM N: 4238101.62 & E: 295409.38. Picture was taken on 5 Oct. 2004.



**Figure 33:** By-Day Creek, Bridgeport Ranger District, looking downstream at Reach 2/Unit 5. This Unit is located at UTM N: 4238101.62 & E: 295409.38. Picture was taken on 5 Oct. 2004.



**Figure 34:** By-Day Creek, Bridgeport Ranger District, looking upstream at the South Fork Unit. This Unit is located at UTM N: 4237966.74 & E: 295310.48. Picture was taken on 6 Oct. 2004.



**Figure 35:** By-Day Creek, Bridgeport Ranger District, looking downstream at the South Fork Unit. This Unit is located at UTM N: 4237966.74 & E: 295310.48. Picture was taken on 6 Oct. 2004.



**Figure 36:** By-Day Creek, Bridgeport Ranger District, approximately ¼ mile upstream of the South Fork Unit. This was the uppermost LCT found in the South Fork of By-Day Creek. The LCT was captured at UTM N: 4237797.98 & E: 295217.98. Picture was taken on 6 Oct. 2004.



**Figure 37:** By-Day Creek, Bridgeport Ranger District, looking upstream at the North Fork Unit. This Unit is located at UTM N: 4238087.18 & E: 295340.29. Picture was taken on 6 Oct. 2004.



**Figure 38:** By-Day Creek, Bridgeport Ranger District, gabion weir on the North Fork of By-Day Creek. Gabion weir is currently a fish barrier. Gabion weir is located on the North fork of By Day Creek approximately 1/3 mile upstream of the North and South Fork confluence. Barrier is located at UTM N: 4238293.69 & E: 294790.06. Barrier is approximately 5-6 feet high.























